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ABSTRACT

This report shows in detail how cost analysis of educational programs has been used at the junior college level. The primary objective of the National Junior College Finance Study is to determine the cost of educating a student in a specified curriculum and to utilize these data to demonstrate the relationship of the unit cost of each of several selected vocational-technical curricula to the unit cost of a basic arts and science transfer curricula. Data were gathered from 15 junior colleges in seven states. Although the unit for analysis may vary among types of institutions, the procedures can be readily adopted for use at other levels. If adequate funding is to be obtained for educational programs, then funding based on cost differentials or differentiated funding seems the most feasible at this time. (Author/CA)

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COST ANALYSIS: FIRST STEP TOWARD DIFFERENTIATED FUNDING

(A REPORT FROM THE NATIONAL COMMUNITY JUNIOR COLLEGE FINANCE PROJECT)

JC 710 101

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INFORMATION

COST ANALYSIS:

FIRST STEP TOWARD DIFFERENTIATED FUNDING

The National Educational Finance Project, of which the Junior College Finance Study was a satellite project, was instituted on June 10, 1968. It was a comprehensive three year project and the first of its kind since 1933. Ten special study satellite projects were conducted concurrently with the Junior College Finance Study during the second year of the three year parent study. The ultimate objective of the total project is to devise models of school finance which can be utilized by educators and legislators in evaluating and improving existing methods for financing education at the state and federal levels.[1]

The National Educational Finance Project includes studies of financing education from early childhood through the junior college. Each satellite project sought to: (1) develop criteria for identifying the target population to be served, (2) develop accurate estimates of the number of persons in each target group, (3) indicate the nature of educational programs needed to meet the needs of each target group, and (4) ascertain the cost differentials implicit in such programs.

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[1]Dimensions of Educational Need. Edited by R. L. Johns, K. Alexander, and R. Rossmiller. National Educational Project, Vol. 1, 1212 SW 5th Avenue, Gainesville, Florida, 1969.

The purpose of this paper is to report the procedures and findings pertinent to the latter of these four goals, and to emphasize how the process of cost analysis of educational programs is the leading step toward receiving more adequate funding for all educational programs.

Briefly let me describe the procedure by which the National Junior College Study was initiated and carried out. The staff's primary objective was to determine the cost of educating a student in a specified curriculum, and to utilize these data to demonstrate the relationship of the unit cost of each of several selected vocational-technical curriculums to the unit cost of a basic arts and science transfer curriculum.[2] Related research was studied to ascertain what previous work had been done in this area. An advisory committee of outstanding educators, knowledgeable in post high school education and research were selected and invited to meet with the staff in the initial planning. The committee assisted in the selection of states, defining target populations and in the development of the basic research design.

Methodology

The study attempted to determine the cost of educating a student in each associate degree program in the community junior college, especially as the cost related to selected occupational and continuing education programs. The data from fifteen colleges in seven states were utilized to determine these costs. The ratios formed by the comparison of costs were denoted as cost differentials, using the cost for a basic nonspecialized Associate in Arts degree as unity.

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2 Wattenbarger, J. L., Cage, B. N. and Arney Lawrence. The Community Junior College: Target Population, Program Costs and Cost Differentials. National Education Finance Project, Special Study No. 6. p. 22, 1212 SW 5th Avenue, Gainesville, Florida. 1970.

A set of six criteria were developed and mailed to three persons in each of the seven states selected by the staff and the advisory committee. These criteria were as follows:

1. The community junior college offers a comprehensive program of studies including university parallel, occupational, and continuing education.
2. The community junior college bases its admission of students upon an "open door" policy.
3. The institution had an enrollment of at least 1500 students in fall, 1968.
4. The institution is recognized by the regional accrediting agency.
5. The community junior college consciously attempts to serve the target population in the district to the fullest extent.
6. The community college provides guidance and counseling services to its students.

These three persons were in some official position related to the community junior colleges in each of those states. These individuals were asked to name up to five institutions which exemplified the criteria in their respective states. The two or three institutions in each state on which the panel of state leaders concurred were selected for investigation. The staff assumed the responsibility for the final decision in making a choice of institutions which were requested to participate.

It is important to note that in this research design a random sample of community junior colleges was not selected. The institutions selected were to be exemplary of the kinds of post high school education educators theorized to develop more universally during the next decade. If one is to construct

models for the financing of educational programs, and if these models are to be feasible among a common set of criteria, then the input data should maximize the current program.

Each of the 15 junior colleges were visited personally by a staff member and one or more graduate assistants. Data relevant to staff, salaries, enrollment, operation and maintenance of plant, capital outlay and auxiliary services were collected. The internal records of each college were perused and pertinent information obtained. A copy of the budget and yearly financial statement for the fiscal year under study was also collected.

Once these data were collected and analyzed, they were used to determine:

1. The average cost per student in selected degree programs in the university parallel curricula.
2. The average cost per student in selected programs in the occupational curricula.
3. A description of budgetary allocations which are currently being used as a percentage of the total budget.
4. The calculation of cost differentials for various degree and occupational programs.

Procedures and Data Analysis

The cost of educating an individual is dependent upon a number of factors as components. The cost components used in this study were those incurred for general administration, instructional salaries, operation and maintenance of facilities, instructional resources, student personnel services, supportive instructional costs, auxiliary services and capital outlay. These component parts, with the exception of capital outlay, are budgetary allocations and were compiled from the year-end financial report of the college. Information concerning capital outlay was not available from all institutions and was not

used in determining cost differentials.

The cost incurred in educating a student also depends upon such variables as the number and types of courses included in his program, the length of the program, the credit hour value of each course, and the cost per credit hour of each course taken. Accordingly, the unit cost was determined for each course by allocating the total institutional expenditures to the course taught. The unit cost of each course in a particular program was then summed to determine the total cost of educating a student in the specified curriculums.

The initial step in computing the unit cost of each course was to allocate the salary of each instructor to the courses which he taught. The direct salary cost per student credit hour was determined by dividing the total salary cost of a course by the total student credit hour for the course.

School-wide costs such as those incurred for general administration, learning resource center, and student personnel services, were allocated to each course on the basis of the ratio of the credit hour enrollment of the course to that of the total credit hour enrollment of the college.

Divisional and departmental expenses were prorated to each course in the respective division or department on the same basis.

After the cost per course was determined, specific course costs were summed to obtain the cost for the arts and science transfer program and selected vocational-technical programs. Using the average cost per student in the liberal arts program, cost differentials for the occupational programs were computed for each institution.

Findings

The first of the subproblems considered in the study was the determination of the average cost per student in selected degree programs in the college

parallel curriculums. It became apparent that there was considerable variation in the cost of programs within and among institutions. Even the liberal arts curriculums, which was common to all institutions, had a range of $970 per year.

The average cost per student in occupational programs varied appreciably more than did the program in liberal arts. Programs in vocational, technical, and health occupations education were consistently more expensive than were liberal arts education programs in the same institution.

However, of greater interest than the average annual cost was the determination of cost differentials. The use of cost data alone caused a comparison of program costs among institutions to be very difficult if not impossible since institutional program costs are influenced by such variables as the needs and objectives of the institution, the geographic location, the "quality" of the program, the variation in instructional salaries, regional cost differences, and institutional policies concerning students per class and instructor work loads. The calculation of a cost differential as previously defined permitted a comparison of interinstitutional costs independent of these and certain other factors.

The data in Table 1 give the cost differentials for a few of the 56 programs analyzed in the study. The differentials ranged from a low of .91 for general business programs to a high of 3.13 for sheet metal workers among all 56 programs. General business and business administration were the only two of the 56 programs having ratios of less than one. However, a word of caution is appropriate at this point. Some of the averages were computed on relatively few cost differentials and in some cases only one was available; accordingly, the data cannot be construed to be completely representative of all such programs. Perhaps, the median would have been more meaningful than the mean in some instances because of the wide variation in cost ratios among the program differentials.

Business administration has the lowest cost differential of the selected programs listed in Table 1. Low differentials were characteristic of all business programs and supported the argument that business oriented programs are no more expensive than the liberal arts general curriculum. This does not mean that we believe that business programs should not be classified as occupational programs but the data simply support the concept that programs should not be considered more expensive to operate merely because they are classified as occupational.

The data given in Table 1 and the total data compiled by the project indicates that, of the occupational programs offered in the fifteen colleges, liberal arts and business programs were the least expensive, social and public service occupations ranked second, vocational programs third, health related occupations fourth, and engineering technology was the most expensive. On the average for each $1.00 spent per student credit hour for the liberal arts program, $1.13 was spent for business occupations, $1.33 for social and public services, $1.51 for vocational education, $1.55 for health related occupations, and $1.65 for technical education.

The average percents of the budget allocations for current operating expenses of eight of the community colleges are given in Table 2. (Comprehensive data for this purpose was not available from seven of the colleges.) Instructional salaries accounted for 51 percent of the operating budget, 10 percent went for general administration, and 11 percent went for operation and maintenance of plant. These findings closely approximate those found by Medsker in a 1969 study of operating costs. The only major deviation was in auxiliary services. Medsker[3] estimated that one percent of the operating budget was spent for this

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[3]Medsker, Leland L. "Control and Support of Community Colleges" (mimeographed report), 1969.

purpose whereas the data in Table 2 indicate four percent. However, it appears this was probably due to a difference in record keeping. As can be seen in Table 2, two of the eight schools did not have a budgetary category for auxiliary services.

The variation of expense within budget categories did not vary more than would be expected in a random distribution of such categorical expense. The consistency of these allocations further support the concept of the institutions being "exemplary" and suggest that other institutions may find the budgetary patterns of these colleges valuable for normative purposes.

As previously mentioned, it was not possible to obtain sufficient data concerning capital outlay from all the sample institutions. There are several reasons for the data not being available; (1) colleges that have been in existence for many years have had no need to keep up to date records on equipment since they have not been required to provide depreciation schedules for auditing purposes; (2) much of the equipment used was inherited from other programs or was "used" equipment, surplus property, or donated by industry which made it difficult to assign a dollar value for such equipment; (3) several programs, data processing for example, used rental equipment, and (4) it is difficult to get people to agree on the "life" of equipment.

Table 3 shows the range of percent of increase in program cost when capital outlay was considered. As to be expected, the effect of the cost of equipment was considerable and ranged from about one percent to 22 percent of the annual program cost.

Morsch[4] stated that the analysis of institutional budgets leads to the

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[4] Morsch, W. C. Study of Community College and Vocational Training Center: Cost Analysis. Bureau of Social Science Research, Washington, D. C., 1969.

conclusion that institutional outlays for equipment are a small item within the total budget. The project staff agreed with this statement showing that equipment costs in the colleges studied amounted to only about 3 percent of the total budget. However, when depreciation is included in the program costs it appears to make a significant difference in cost. Although the effect of equipment depreciation is negligible in terms of the institutional budget, it has a substantial impact on specific program costs.

The data in Table 3 make it evident that the effect of depreciating equipment is quite different for different types of curriculums. For example, a machine shop may cost $85,000 to $250,000 to equip. The amount to be allowed for depreciation each year is substantial and may increase the annual program cost by 10 to 21 percent. On the other hand, a drafting laboratory can be equipped for considerably less and may change the annual program cost by only 4 to 8 percent.

Use of Cost Data

The procedures described above for ascertaining program costs and cost differentials need not be limited to community junior colleges. These procedures are applicable to elementary schools, high schools, colleges and universities. Each institution must define the unit on which the cost is determined, but once this is done, the procedures are very similar.

To date there has been relatively little research done in terms of cost analysis at the elementary or secondary school level. By far the most comprehensive to date is the doctoral study by Alexander Guy.[5] In his study at the University of Alberta, Guy used an "exact expenditure accounting" method utilizing the Reason and White accounting system. His study entailed a cost analysis of all the comprehensive high schools in the providence of Saskatchewan, Canada.

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[5]Guy, Alexander J. Y. "A Unit Cost Analysis of the Comprhensive High Schools in Saskatchewan." Doctoral dissertation. University of Alberta, 1970.

At the college and university level the process of cost analysis becomes much more entailed. Except for a few colleges and universities, no large scale research of this kind has taken place in four year institutions of higher learning. However, it is the writers' belief that such a procedure, granted to be time consuming and somewhat complex in some areas, is an answer to better funding for educational programs. I will speak to this point in a few minutes.

One of the recommendations to come from the National Junior College Finance Study was the need for more and better record keeping within the institution. It is not feasible to embark on a detailed cost analysis study unless you are confident that sufficient and pertinent data are available. Baker emphasizes this point as follows:

> We need more information to determine the real cost of existing programs and the real cost of introducing new programs. We need a type of record keeping which would give management the opportunity to determine the cost effectiveness and determine alternative methods of introducing new programs into the curricula which will produce greater benefits at less cost.

In addition to the managerial needs, Baker also notes that:

> No evaluation technique exists in the educational organization as it does in commercial or profit organizations. Legislators with 60-70% of their state's appropriations going directly to education are starting to demand answers. They want to know what is being accomplished for each dollar spent in education. They are looking for the most economical way of providing the educational program. They are reviewing formulae for allocating funds for current operations and for construction and equipment.[6]

One of the foremost types of accounting procedures being pursued by educational systems currently is PPBS (Planning-Programming-Budgeting-System).

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[6] Baker, Thomas M. "Financial Management and Reporting in Junior Colleges State and Local." Junior College, Local and State Relations. Edited by Dayton Roberts, Institute of Higher Education, University of Florida, Gainesville, Florida, 1968.

The information available from this system is readily compatible to the cost analysis procedure described herein. Staats[7] supported the need for PPBS as a forerunner to cost information in his testimony before a Congressional subcommittee in 1968. His four points were:

1. Cost information is necessary for the development and selection of the mix of inputs.
2. Cost information is necessary for the control of programs.
3. Cost information provides some quantitative basis for evaluation where the possible benefits cannot be measured and compared.
4. Cost information is necessary for traditional fund account purposes.

It is the writers' contention that institutions having detailed program cost information will have a greater chance of obtaining adequate funding for their educational programs. The Committee on Standards of the College Delegate Assembly from the Southern Association of Colleges and Schools reported in 1966 that an expenditure analysis was becoming a must in their Association.[8] It was their belief that the financial resources of a college or university determines, in part, the quality of its educational programs. The adequacy of the resources of an institution is to be judged in relation to the basic purposes of the institution, the scope of its programs, and the number of its students. The financial resources could best be afforded to the institutions when they could

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[7] U. S. Congressional Senate Committees in Government Operations, "Planning-Programming_Budgeting" hearing before Subcommittee, 90th Congress, 2nd Seesion, Part 3, March 26, 1968. Government Printing Office, Washington, D. C. 1968.

[8] Standards of the College Delegate Assembly. Atlanta, Gerogia, The Southern Association of College and Schools. 1966.

show a detailed analysis of their expenditures to the legislature.

From 1934 to 1959 a series of cost studies were done in institutions of higher education in Michigan. Hubbard[9] reported that in 1960, Michigan enacted a law that all public universities must analyze and report their operating costs each year by student level. This legislation was prompted by the results of the cost anlaysis studies performed in previous years. Seymore Harris[10] concluded that the determination of costs are worthwhile and are used much more widely now than previously. He cited the states of Oklahoma, California, Georgia, New Mexico, Texas, and Indiana where school officials use cost analysis studies to explain and justify budgetary needs.

Once cost differentials for all programs have been determined, funds can be requested on the same differential basis. For example, if the Associate of Arts degree program for Liberal Arts is reimbursed at the rate of $ X per student credit hour, and the cost differential for Mechanical Technology was 2.33, then the Mechanical Technology program would be reimbursed at the rate of 2.33 times $ X per student credit hour.

In summary, the writers have shown in detail how cost analysis of educational programs has been used at the junior college level. Although the unit for analysis may vary among types of institutions, the procedures can be readily adopted for use at other levels. If adequate funding is to be obtained for educational programs, then funding based on cost differentials, or differentiated funding, if you prefer, seems the most feasible at this time.

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[9]Hubbard, Robert E. An approach to institutional cost analysis. Journal of Experimental Education 31:109-113. 1962

[10]Harris, Seymore E. Higher education: resources and finance. New York, New York, McGraw-Hill Book Company. 1962.

APPENDIX

TABLE 1

Cost Differential
Community Junior College Programs

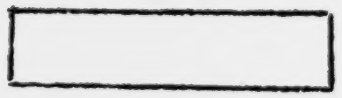
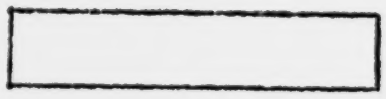
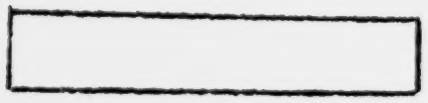
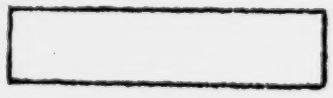
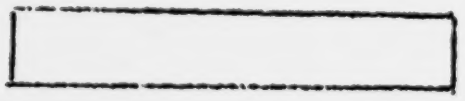
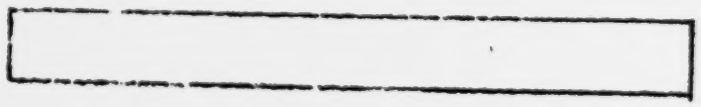
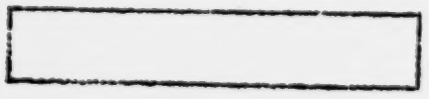
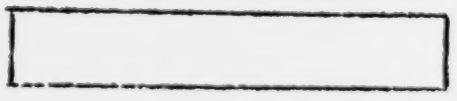
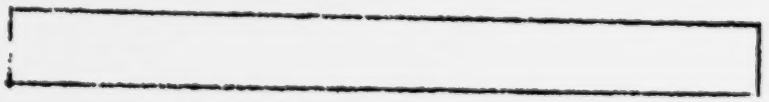
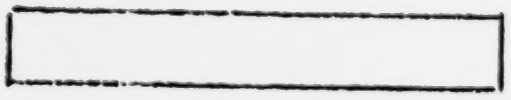
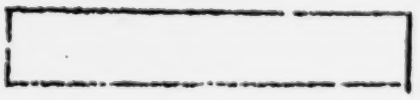
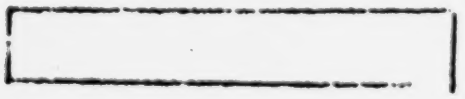
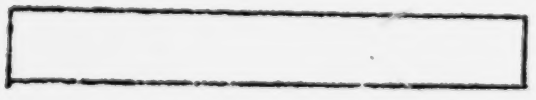
Liberal Arts (General)		1
Liberal Arts (Science)		1.12
Automotive Mechanics		1.27
Business Administration		.99
Civil Technology		1.39
Chemical Engineering & Technology		2.1
Data Processing		1.26
Dental Assistance		1.36
Mechanical Drafting		
Nursing A.A		1.51
Welding		1.24
Cosmetology		1.39
Mortuary Science		1.59

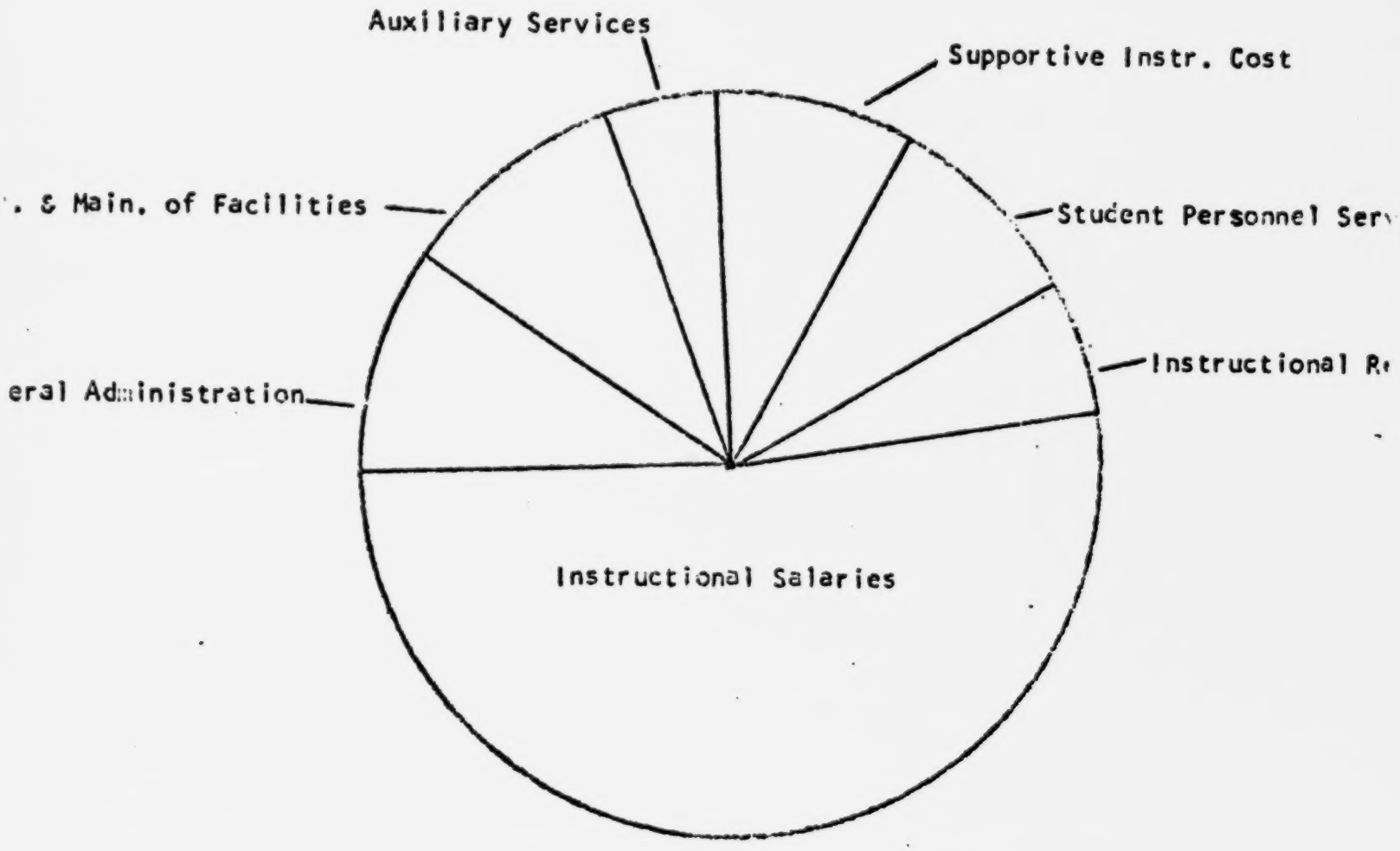
TABLE 2

Budget Allocations For

Current Operating Expenses

of

Community Colleges



Average For 8 Exemplary Community Colleges

BUDGET CATEGORY	E	N	M	C	K	F	H	A	Average
	(Percents Rounded to Nearest Whole Number)								
Instructional Salaries	42	54	53	53	44	62	47	57	51
General Administration	15	12	15	8	8	4	9	8	10
Oper. & Maint. of Facilities	15	12	8	10	12	10	9	12	11
Instructional Resources	9	4	4	5	4	4	10	3	5
Student Personnel Services	7	13	7	5	8	11	8	11	9
Supportive Instr. Costs	7	4	12	15	12	9	15	8	10
Auxiliary Services	6	2	0	4	12	0	3	3	4

TABLE 3

Additional Costs For Programs
Including Capital Outlay Expenditures for Equipment